What Is Claimed Is:

1.   A method for controlling the serial transport of articles to achieve a predetermined gap between transported articles, the method including:

transporting a first article on a transport system;

transporting a second article on the transport system immediately upstream of the first article;

measuring a variable first velocity and first position for the first article;

measuring a variable second velocity and second position for the second article;

for each period in a periodic operating cycle adjusting a position of the second article based on the position of the first article as follows:

(a) calculating a current gap between the first and second articles as a function of a distance between a trail edge of the first article and the lead edge of the second article;

(b) subtracting the predetermined gap from the current gap, the resulting difference herein referred to as distance Xt;

(c) calculating a displacement needed to decelerate the second article from the second velocity to the first velocity of the first article at a negative value of a maximum acceleration parameter, the calculated displacement referred to as distance Xdecel; and

(d) if Xt is substantially the same as Xdecel, and the second velocity is different than the first velocity, accelerating the second article at a calculated acceleration so that Xt can remain substantially the same as Xdecel at the end of the current operating cycle period, the calculated acceleration being a function of the maximum acceleration parameter, the second velocity, and the first velocity.

2.   The method of claim 1 wherein the step of adjusting the position of the second article based on the position of the first article further includes:

(e) if Xt is greater than Xdecel and the second velocity is less than a maximum velocity, accelerating the second article at a predetermined acceleration; and

(f) otherwise, maintaining the second article at the second velocity without acceleration for the current operating cycle period

3.   The method of claim 1 wherein the calculated acceleration is determined by a quadratic equation and including the step of discarding a root of the quadratic equation that represents an unreasonable acceleration greater in magnitude than the maximum acceleration parameter.

4.   The method of claim 1 wherein a velocity for the second article at the end of a given operating cycle period is designated "v1," a length of time for the operating

cycle period is designated as "t," a velocity for the second article at the beginning of the given operating cycle period is designated "v0," the maximum acceleration parameter is designated as "A," a velocity of the first article for the given operating cycle is designated as "vds," and the calculated acceleration for the given operating cycle period is designated as "a," and further including the step calculating the calculated acceleration, a, using a quadratic calculation based on the following equations:

$$v1\, t + \frac{1}{2}\frac{v0^2 - v1^2}{A} = vds\, t$$

and

$v1 = v0 + at.$

5.   The method of claim 4 including the step of discarding a root of the quadratic calculation of "a" that represents an unreasonable acceleration greater in magnitude than the maximum acceleration parameter.

6.   The method of claim 4 including the step of assuming vds to be a constant velocity during the given operating cycle period.

7.   The method of claim 1 wherein the steps of transporting the first and second articles includes stopping the articles at a series of stopping stations along

a transport path and further including the step controlling the stopping stations by

detecting the second article within a second stopping station;

detecting whether the first article is present downstream in a first stopping station immediately downstream of the second stopping station;

stopping the second article in the second stopping station if the first article is detected in the first stopping station; and

transporting the second article from the second stopping station to the first stopping station if the first article is not detected in the first stopping station.

8.   The method of claim 7 further including the step of:

coordinating control of transporting the second article such that the second article will always decelerate to a lower of a velocity as directed by one of the two steps of controlling the stopping stations or adjusting a position of the second article based on the position of the first article as follows.

9.   The method of claim 7 wherein the step of stopping the second article includes advancing the second article as far as possible in the second stopping station while retaining enough of the article upstream of the stopping station to allow accelerating the article to a desired release velocity upon resuming of transporting of the second article.